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(54) Optical coupling device.

(57) The invention relates to an optical terminating set for time-modulated optical transmission signals. The problem of crosstalk attenuation of the terminating set specific for these signals is solved by concentrically coupling a first glass fibre (1) to a second glass fibre (2) with a larger core diameter in the coupling area. The signal emerging in the difference area from the glass fibre with larger core diameter is supplied to a detector (4) either via a mirror (3) or directly.

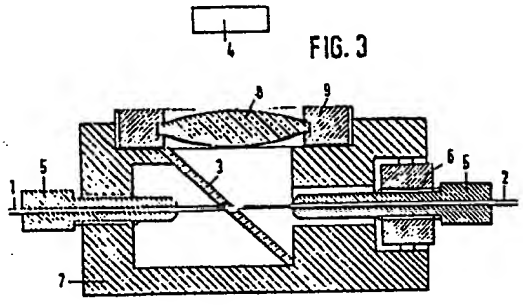

FIG. 3

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Croydon Printing Company Ltd.

HIGH SPEED WINDER FOR NON-EXTENSIBLE YARNS.

This invention relates to a vertically mounted high speed winding device for substantially non-extensible yarns, for example, air jet textured yarns.

As used herein the term "high speed winding" means winding at a yarn speed in the range of from at least 300 meters per minute to about 1000 meters per minute. The term "helix angle" means the acute angle between the helix or convolution of the yarn and a diametrical plane intersecting the convolution.

Several winding devices known in the art utilize a relatively low speed yarn traversing means which has a diminishing stroke length as the yarn package builds in order to produce a package with conical ends. When such a device is used for high speed winding of textile yarns, the yarn is laid down on the package at a small helix angle because of a high yarn speed to traverse speed ratio. As a consequence of the small helix angle, the yarn package so produced tends to exhibit poor yarn take-off characteristics and also tends to have unstable conical portions due to sloughing of the yarn therefrom caused by inadequate cohesion between the yarn at the package ends and the package body.

U.S. Patent No.4 085 903 discloses a yarn winding device for false twist textured yarns, i.e. extensible yarns, in which a vertically mounted rotatable package is driven by surface contact with a driven roller. An eccentrically mounted rotatable disc having a peripheral

groove is positioned on a reciprocating traverse means which is adapted to traverse to and fro along the length of the package as yarn is wound thereon. The rotation of the disc about its eccentric axis caused by the yarn travelling in the peripheral groove of the disc imparts a sinusoidal pattern to the yarn being laid down on the package thus providing a substantial angle between successive wraps of yarn on the package. The presence of the sinusoidal pattern and the substantial helix angle improves the take-off characteristics of the yarn and also ensures good cohesion between the yarn at the package ends and the package body i.e. the sinusoidal pattern effectively locks the yarn at the package ends into the package body.

The yarn winding device disclosed in the aforementioned U.S. Patent 4 085 903 is very satisfactory where used for the high speed winding of false twist textured or other extensible yarn. However, the winding device of U.S. Patent 4 085 903, where employed for high speed winding of substantially non-extensible yarn, for example such a yarn produced by an air jet texturing device, has the disadvantages of high winding tension peaks and that at certain positions of the reciprocating traverse means the rotation of the eccentrically mounted disc tends to slow down at the point where the yarn path around the peripheral groove of the disc to the yarn package is at its shortest length. This slowing down of the disc rotation, which is believed to be due to the inability of the substantially non-extensible yarn to compensate for the changing length of the yarn path around the peripheral

this conical light guide will become so large that in case of radiation into the light guide 2 the losses will be too great. The coupling between the light guides 1 and 2 can be realized by means of a suited sort of glue. In the embodiment the conicalness of the light guide 1 has been achieved by periodically dipping this light guide into an acid, in this case ammonium bifluoride, for some time. It is important that the surface of the conical end is smooth to prevent the optical signal from emerging prematurely. The inclination of the conical end of the light guide 1 depends on the sort of light guide used.

In a suited embodiment the core diameter is 65 µm, the diameter of the coupling area 30 µm and the length of the conical end ± 7.5 mm. It is self-evident that it is also possible to use two light guides of unequal cross sections allowing the conical end to be dispensed with.

The mirror 3 can be of a piece with a little hole in the mirror surface. It is simpler, however, to use a mirror consisting of two parts in case the substrate is difficult to work. Instead of a plane mirror the mirror can also have a hollow shape, so that no lens is needed. The distance between the coupling area and the mirror is not particularly critical. If the distance is too small, the hole in the mirror plays too great a part. A great distance between the coupling area and the mirror reduces the influence of the hole, but the drawback is that the part of the light guide 1 which is not supported will be large.

Fig. 2 shows another possible embodiment of the device according to the invention. This embodiment does not make use of a mirror and is therefore economically attractive with regard to the embodiment according to Fig. ..

Fig. 3 shows a possible embodiment of the device according to the invention of which Fig. 1 gives a more diagrammatic representation. The light guides 1 and 2 are each mounted in a holder 5. The holder 5 of the light guide 2 is mounted in the housing 7 via a clamping screw 6, which is radially adjustable with regard to the light guide axis. A lens 8 mounted in a lens mount 9 is located over the mirror 3. The detector 4 can be directly connected to the lens mount 9, thus allowing the receiving part to be removed in its entirety. Another possibility is to mount a third holder for

a light guide instead of the detector 4, so that the optical signal reflected from the light guide 2 can be radiated into a third light guide via the mirror 3. In this way an optical terminating set is obtained.

When the cross-sectional ratio of the cores of the light guides 1 and 2 is 4 in the coupling area, the optical attenuation of the signal radiated by the light guide 2 to the detector 4 will be smaller than 3 dB. In this embodiment the optical attenuation of the signal directly radiated to the detector 4 by the light guide 1 is > 30 dB. This offers the possibility of utilizing a sensitive detector, which will not be overloaded by the strong signal transmitted from the light guide 1.

Claims:

1. Coupling device for time-modulated optical transmission signals, comprising a first light guide for transmitting a first signal, a second light guide for receiving the signal from the first light guide and for reflecting a second signal, and means for receiving the second signal, characterized in that in a coupling area between the adjacent first and second light guide the cross-sectional area of the core of the first light guide is smaller than the cross-sectional area of the core of the second light guide, the second optical signal, after having emerged from the difference area, being supplied to the receiving means.

2. Optical coupling device according to claim 1, characterized by a mirror mounted at an angle with the longitudinal axis of the second light guide to supply the second optical signal to the receiving means.

3. Optical coupling device according to claim 2, characterized in that the mirror is hollow.

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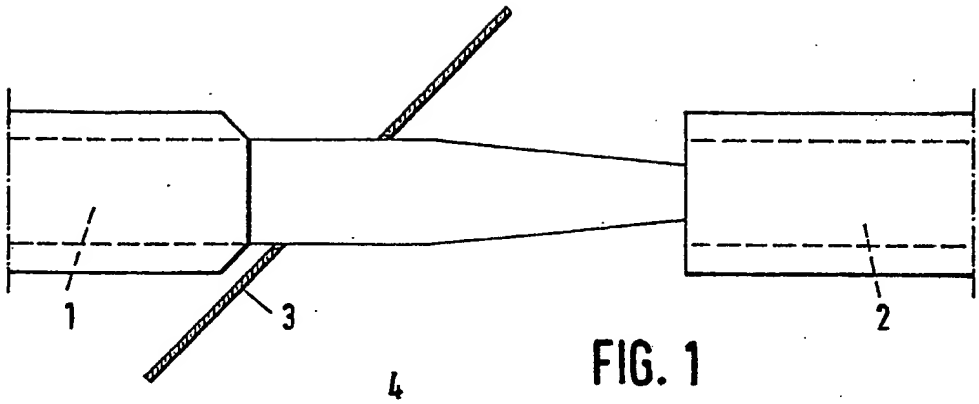


FIG. 1

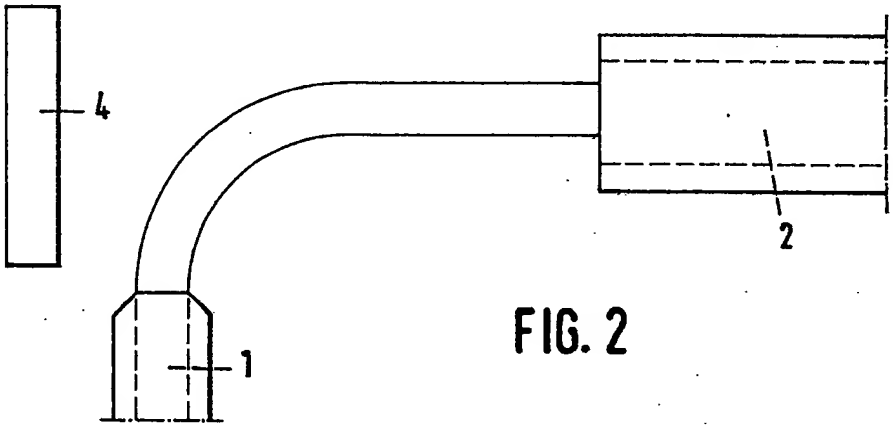


FIG. 2

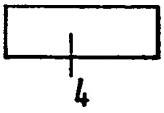
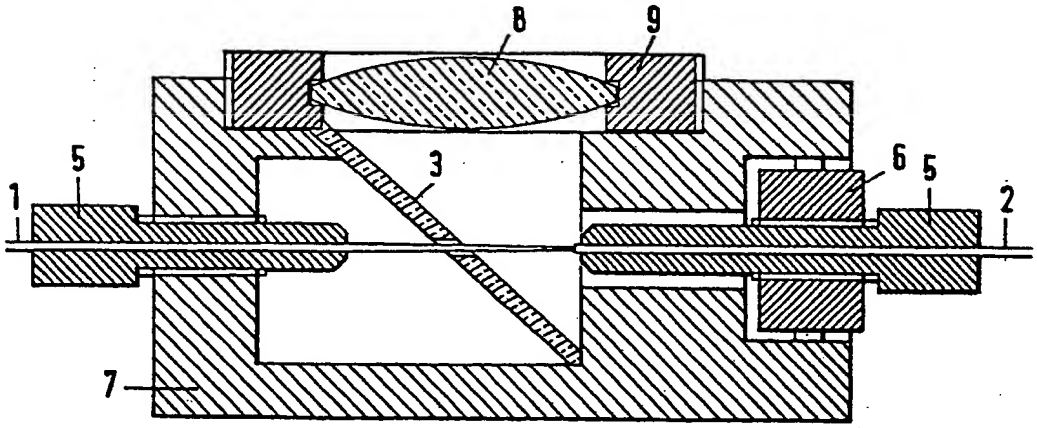


FIG. 3



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EUROPEAN SEARCH REPORT

0014510
Application number
EP 80 20 0091

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	GB - A - 1 017 354 (CONTINA BUREAUK UND RECHENMASCHINENFABRIK A.G.) * Page 2, lines 3-115; figures 1,2 * --	1
	US - A - 4 021 099 (B.S. KAWASAKI et al.) * Columns 3,4; figures 2,4,7 * ----	1-3

CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)

G 02 B 7/26

TECHNICAL FIELDS SEARCHED (Int.Cl. ³)

G 02 B 7/26

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21-04-1980	MALIC

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US-CL-CURRENT: 385/15, 385/32 , 385/43

ABSTRACT:

CHG DATE=19990617 STATUS=O> The invention relates to an optical terminating set for time-modulated optical transmission signals. The problem of crosstalk attenuation of the terminating set specific for these signals is solved by concentrically coupling a first glass fibre (1) to a second glass fibre (2) with a larger core diameter in the coupling area. The signal emerging in the difference area from the glass fibre with larger core diameter is supplied to a detector (4) either via a mirror (3) or directly.